

§ 1065.520

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§ 1065.520 Pre-test verification procedures and pre-test data collection.

(a) If your engine must comply with a PM standard, follow the procedures for PM sample preconditioning and tare weighing according to §1065.590.

(b) Unless the standard-setting part specifies different tolerances, verify at some point before the test that ambient conditions are within the tolerances specified in this paragraph (b). For purposes of this paragraph (b), “before the test” means any time from a point just prior to engine starting (excluding engine restarts) to the point at which emission sampling begins.

(1) Ambient temperature of (20 to 30) °C. *See* §1065.530(j) for circumstances under which ambient temperatures must remain within this range during the test.

(2) Atmospheric pressure of (80.000 to 103.325) kPa and within ± 5 kPa of the value recorded at the time of the last engine map. You are not required to verify atmospheric pressure prior to a hot start test interval for testing that also includes a cold start.

(3) Dilution air conditions as specified in §1065.140, except in cases where you preheat your CVS before a cold start test. We recommend verifying dilution air conditions just prior to the start of each test interval.

(c) You may test engines at any intake-air humidity, and we may test engines at any intake-air humidity.

(d) Verify that auxiliary-work inputs and outputs are configured as they were during engine mapping, as described in §1065.510(a).

(e) You may perform a final calibration of the speed, torque, and proportional-flow control systems, which may include performing practice duty cycles.

(f) You may perform the following recommended procedure to precondition sampling systems:

(1) Start the engine and use good engineering judgment to bring it to one of the following:

(i) 100% torque at any speed above its peak-torque speed.

(ii) 100% operator demand.

(2) Operate any dilution systems at their expected flow rates. Prevent aqueous condensation in the dilution systems.

(3) Operate any PM sampling systems at their expected flow rates.

(4) Sample PM for at least 10 min using any sample media. You may change sample media during preconditioning. You may discard preconditioning samples without weighing them.

(5) You may purge any gaseous sampling systems during preconditioning.

(6) You may conduct calibrations or verifications on any idle equipment or analyzers during preconditioning.

(7) Proceed with the test sequence described in §1065.530(a)(1).

(g) Verify the amount of nonmethane hydrocarbon contamination in the exhaust and background HC sampling systems within 8 hours before the start of the first test interval of each duty-cycle sequence for laboratory tests. You may verify the contamination of a background HC sampling system by reading the last bag fill and purge using zero gas. For any NMHC measurement system that involves separately measuring methane and subtracting it from a THC measurement or for any CH₄ measurement system that uses an NMC, verify the amount of THC contamination using only the THC analyzer response. There is no need to operate any separate methane analyzer for this verification; however, you may measure and correct for THC contamination in the CH₄ sample train for the cases where NMHC is determined by subtracting CH₄ from THC or, where CH₄ is determined, using an NMC as configured in §1065.365(d), (e), and (f); and using the calculations in §1065.660(b)(2). Perform this verification as follows:

(1) Select the HC analyzer range for measuring the flow-weighted mean concentration expected at the HC standard.

(2) Zero the HC analyzer at the analyzer zero or sample port. Note that FID zero and span balance gases may be any combination of purified air or purified nitrogen that meets the specifications of §1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-

weighted mean concentration of O₂ expected during testing.

(3) Span the HC analyzer using span gas introduced at the analyzer span or sample port. Span on a carbon number basis of one (C₁). For example, if you use a C₃H₈ span gas of concentration 200 µmol/mol, span the FID to respond with a value of 600 µmol/mol.

(4) Overflow zero gas at the HC probe inlet or into a tee near the probe outlet.

(5) Measure the THC concentration in the sampling and background systems as follows:

(i) For continuous sampling, record the mean THC concentration as overflow zero gas flows.

(ii) For batch sampling, fill the sample medium (e.g., bag) and record its mean THC concentration.

(iii) For the background system, record the mean THC concentration of the last fill and purge.

(6) Record this value as the initial THC concentration, $X_{\text{THC}[\text{THC-FID}]\text{init}}$, and use it to correct measured values as described in § 1065.660.

(7) You may correct the measured initial THC concentration for drift as follows:

(i) For batch and continuous HC analyzers, after determining the initial THC concentration, flow zero gas to the analyzer zero or sample port. When the analyzer reading is stable, record the mean analyzer value.

(ii) Flow span gas to the analyzer span or sample port. When the analyzer reading is stable, record the mean analyzer value.

(iii) Use mean analyzer values from paragraphs (g)(2), (g)(3), (g)(7)(i), and (g)(7)(ii) of this section to correct the initial THC concentration recorded in paragraph (g)(6) of this section for drift, as described in § 1065.550.

(8) If any of the $X_{\text{THC}[\text{THC-FID}]\text{init}}$ values exceed the greatest of the following values, determine the source of the contamination and take corrective action, such as purging the system during an additional preconditioning cycle or replacing contaminated portions:

(i) 2% of the flow-weighted mean wet, net concentration expected at the HC (THC or NMHC) standard.

(ii) 2% of the flow-weighted mean wet, net concentration of HC (THC or NMHC) measured during testing.

(iii) 2 µmol/mol.

(9) If corrective action does not resolve the deficiency, you may request to use the contaminated system as an alternate procedure under § 1065.10.

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§ 1065.525 Engine starting, restarting, and shutdown.

(a) For test intervals that require emission sampling during engine starting, start the engine using one of the following methods:

(1) Start the engine as recommended in the owners manual using a production starter motor or air-start system and either an adequately charged battery, a suitable power supply, or a suitable compressed air source.

(2) Use the dynamometer to start the engine. To do this, motor the engine within ±25% of its typical in-use cranking speed. Stop cranking within 1 second of starting the engine.

(3) In the case of hybrid engines, activate the system such that the engine will start when its control algorithms determine that the engine should provide power instead of or in addition to power from the RESS. Unless we specify otherwise, engine starting throughout this part generally refers to this step of activating the system on hybrid engines, whether or not that causes the engine to start running.

(b) If the engine does not start after 15 seconds of cranking, stop cranking and determine why the engine failed to start, unless the owners manual or the service-repair manual describes the longer cranking time as normal.

(c) Respond to engine stalling with the following steps:

(1) If the engine stalls during warm-up before emission sampling begins, restart the engine and continue warm-up.

(2) If the engine stalls during preconditioning before emission sampling begins, restart the engine and restart the preconditioning sequence.

(3) Void the entire test if the engine stalls at any time after emission sampling begins, except as described in § 1065.526. If you do not void the entire